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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/564,832	01/17/2006	Robert Fischer	1454.1666	5115

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EXAMINER	
HASSAN, SARAH	

ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
04/01/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/564,832	FISCHER ET AL.	
	Examiner	Art Unit	
	SARAH HASSAN	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 March 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *8-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8* is/are rejected.

7)☒ Claim(s) *9-10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/21/11 has been entered.

Allowable Subject Matter

2. Claims 9-10 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claim 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Fischer et al, "Space-Time Transmission using Tomlinson-Harashima Precoding" Proceedings of 4th International ITG Conference on Source and Channel Coding, January 2002, pp. 139-147 in view of Yao et al, "Lattice-Reduction-Aided Detectors for MIMO Communication Systems" published in 2002.**

Fischer teaches "A nonlinear precoding method" [see page 139, 'Abstract'] "based on modulo arithmetic" [see page 142, second column] "for the transmit-side preequalization of K user signals to be transmitted concurrently using a frequency in a digital broadcast channel" [see page 142, Figure 4; page 143, 1st column, 3rd paragraph] "with known transmission behavior set up between a central transmitting station and K decentralized, non-interconnected receiving stations" [see page.145, 2nd column, 4th paragraph]. Fishcer discloses Tomlinson Harashima precoding method which is a nonlinear precoding method based on modulo arithmetic. Fischer discloses the spatial equalization or "preequalization" at the transmitter. Tomlinson Harashima is used in the digital broadcast channel because a plurality of user signal present at common transmitter is digitally transmitted to plurality of decentralized receivers as detailed in page 145, 2nd column, 4th paragraph.

"the user signals consisting of data symbols ak with k from 1 to K from a signal constellation having Mk levels and a signal point spacing Ak with a periodic multiple representation of the undisturbed transmitted data symbols ak in data symbol intervals congruent for K receive-side modulo decision devices" [see page 143, column 1, paragraph 4], "a transmit-power minimizing selection of representatives vk from the

range of values ak+Ak'Mk'zkk where Zkk are integers, and linear preequalization of the selected representatives vk to form transmit signals xk to be transmitted" [see page 143, col. 1, 6th paragraph].

"eliminating the interference symbols by the K receive-side modulo decision devices" [see page 146, column 1, 3rd paragraph].

It should be noted however that Fischer does not specifically teach "applying the nonlinear precoding method only to a reduced channel matrix….whose interference elements are chosen to assume the range of values...from the set of positive or negative integers including zero."

On the other hand, Yao teaches "only to a reduced channel matrix Hred that is calculated from the equation H = Hred R, whereby H is the known channel matrix and R is a residual interference matrix R, whose interference elements are chosen" [see page 424, 2nd column, 4th paragraph; page 425, col. 2, 3rd paragraph]

It would have been obvious to one of ordinary skill in the art to combine the teachings of Fischer with the teachings of Yao because Yao discloses lattice reduction detection method that requires less calculation steps, thereby making it less complex as detailed in page 428, 2nd column, 'Summary and Future Work.'

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SARAH HASSAN whose telephone number is (571)270-

3456. The examiner can normally be reached on Monday through Friday (available 8:00 AM - 5:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571)272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sarah Hassan/
Examiner, Art Unit 2611
/Shuwang Liu/
Supervisory Patent Examiner, Art Unit 2611